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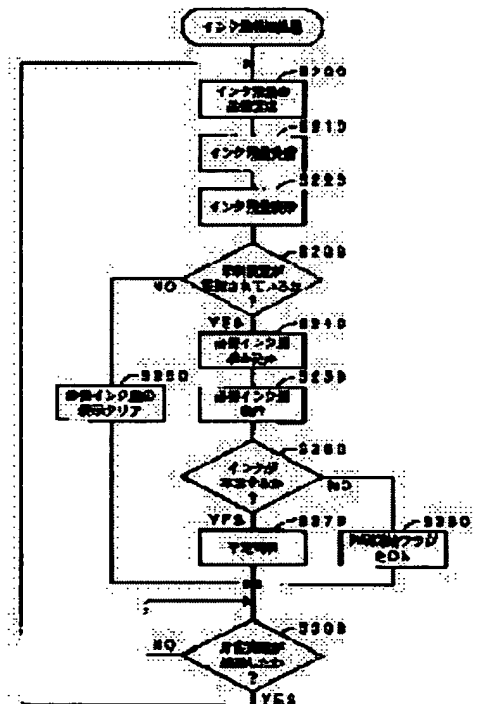
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(54) PRINTING SYSTEM, PRINTING CONTROL DEVICE USED THEREFOR AND METHOD FOR ESTIMATING NECESSARY AMOUNT OF INK

(57)Abstract:

PROBLEM TO BE SOLVED: To allow a user to know prior to printing whether or not an out-of-ink condition occurs during printing by a printer in a printing system.

SOLUTION: When an instruction for executing printing is provided by a user, an RIP(raster image processor) turns off a printing start flag so that the printing is interrupted. The RIP requests transmission of a residual quantity of ink in a printer (S200) and receives the residual quantity of ink transmitted from the printer in response to the request (S210). The RIP predicts a quantity of ink necessary for the printing in the printer based on preview data. A residual quantity of the ink and the predicted necessary quantity are compared with each other by each color of the ink to be indicated by using a graph (S260 and S250). When the ink is deficient (S260: YES), the result is indicated (S270).



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CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION
TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] The information processing terminal which generates the data for printing, and the airline printer which performs printing to recorded media based on the data for printing, In the print system equipped with the print control unit which changes the data which intervene between said information processing terminals and said airline printers, and serve as said candidate for printing at least into said data for printing which can be processed with said airline printer The amount prediction means of need [that said print control unit predicts the amount of need / of being the amount of ink required for printing / ink based on the data for / from said information processing terminal / printing] ink, An ink information-requirements means to require transmission of the ink information which is the information for checking the residue of the ink in the airline printer concerned from said airline printer, It has an ink information receiving means to receive said ink information transmitted from said airline printer. On the other hand, said airline printer If there is a Request to Send of the ink information by ink information management means to manage said ink information, and said ink information-requirements means It has an ink information transmitting means to transmit said ink information managed by said ink information management means to said print control unit. Either [at least] said information processing terminal or said print control unit precedes activation of the printing processing in said airline printer. It is based on the amount of need [of having been predicted by said amount prediction means of need ink] ink, and the ink information received by said ink information receiving means. The print system characterized by having an amount information information means of ink to be in the middle of activation of said printing processing, and to report directly or indirectly whether ink runs short.

[Claim 2] It is the print system characterized by being constituted so that the ullage of ink may be reported when said amount information information means of ink measures the ink residue based on said ink information, and said amount of need ink in a print system according to claim 1 and ink is insufficient.

[Claim 3] It is the print system characterized by being constituted so that said ink information-requirements means may require transmission of said ink information in a print system according to claim 1 or 2 repeatedly at intervals of predetermined time.

[Claim 4] It is the print system which said print control unit is equipped with a preview data generation means generate the preview data for a print preview , in a print system according to claim 1 to 3 based on the data for [which was generated at said information processing terminal] printing , and is characterized by to be constituted said amount prediction means of need ink so that said amount of need ink may predict based on the preview data generated by said preview data generation means .

[Claim 5] it be the print system characterize by to be constitute so that the amount of ink which said amount prediction means of need ink average the gradation of each pixel of the image based on said preview data in a print system according to claim 4 , ask for the average concentration of the printing image corresponding to the averaged gradation concerned , and serve as the average concentration concerned in actual printing size may be predict as an amount of need ink .

[Claim 6] While performing printing to recorded media based on the information processing terminal which generates the data for printing, and the data for printing If there is a Request to Send of the ink information which is the information for checking an ink residue from the exterior In the print control unit which changes the data which are made to intervene between the airline printers which transmit said managed ink information, are used, and serve as said candidate for printing at least into said data for printing which can be processed with said airline printer The amount prediction means of need [of predicting the amount of need / of being the amount of ink required for printing / ink based on the data for / from said information processing terminal / printing] ink, An ink information-requirements means to require transmission of said ink information from said airline printer, An ink information receiving means to

receive said ink information transmitted from said airline printer, In advance of activation of the printing processing in said airline printer, it is based on the amount of need [of having been predicted by said amount prediction means of need ink] ink, and the ink information received by said ink information receiving means. The print control unit characterized by having an amount information information means of ink to be in the middle of activation of said printing processing, and to report directly or indirectly whether ink runs short.

[Claim 7] While performing printing to recorded media based on the information processing terminal which generates the data for printing, and the data for printing If there is a Request to Send of the ink information which is the information for checking an ink residue In the print control unit which changes the data which are made to intervene between the airline printers which transmit said managed ink information, are used, and serve as said candidate for printing at least into said data for printing which can be processed with said airline printer The amount prediction means of need [of predicting the amount of need / of being the amount of ink required for printing / ink based on the data for / from said information processing terminal / printing] ink, An ink information-requirements means to require transmission of said ink information from said airline printer, An ink information receiving means to receive said ink information transmitted from said airline printer, The print control unit characterized by having an information transmitting means to transmit the amount of need [of having been predicted by said amount prediction means of need ink] ink, and the ink information received by said ink information receiving means to said information processing terminal.

[Claim 8] The amount prediction approach of need [of predicting the amount of ink which creates the preview data for a print preview, averages the gradation of each pixel of the image based on the created preview data concerned based on the data for / which was generated at the information-processing terminal / printing, asks for the average concentration of the printing image corresponding to the averaged gradation concerned, and serves as said average concentration in actual printing size as an amount of need ink] ink.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the technique of grasping lack of the ink in the airline printer connected to the print control unit before printing processing activation.

[0002]

[Description of the Prior Art] Conventionally, the print system which prints the data for [which was created at the information processing terminal] printing with an airline printer is known. In this system, the print control unit called RIP (Raster Image Processor) for changing the data for printing into the data for printing which can be processed with an airline printer will intervene between an information processing terminal and an airline printer. That is, the data for printing are PDL (Page Description Language), such as PostScript, or since it is image data, such as TIFF and JPEG, the inverter to the data for printing which can be processed with an airline printer is usually needed.

[0003] A thing equipped with the function as this print control unit also has an information processing terminal with a small-scale system, for example, a personal system. On the other hand, the configuration which connects a print control unit with an information processing terminal on a network as another object for the purpose of the processing unloading of an information processing terminal is adopted with the large-scale system, for example, the system built as a network. It is condition of transmitting the data for printing to the airline printer which changed the data for [that] printing into the data for printing, and was connected when the print control unit was received through an information processing terminal to the network at this time.

[0004]

[Problem(s) to be Solved by the Invention] By the way, in such a print system, the ink of an airline printer is in the middle of printing, and may be insufficient. At this time, there were some airline printers which continue printing while ink had been lost. In this case, since a color omission occurs, it will be necessary to perform printing processing again.

[0005] Moreover, it reported that ink was lost and the airline printer which interrupts printing processing in the phase also occurred. After replacing ink with such an airline printer, printing processing is continuable from an interruption part. However, even if it is this case, by stopping, as recorded media, such as a form, are once printings, setting and a gap arise in recorded media, printing unevenness will be made or printing will become discontinuity before and behind an interruption part.

[0006] That is, when the ink of an airline printer is in the middle of printing and runs short, it is necessary to perform printing processing again in many cases. Especially, in oban printing, for example, printing of A0 size or the magnitude beyond it, if redo of such printing arises, since the cost of recorded media or ink is large, remarkable damage will occur.

[0007] This invention is made in order to solve the trouble mentioned above, and it aims at a user enabling it to grasp whether ink runs short in the middle of printing in an airline printer in advance of printing.

[0008]

[The means for solving a technical problem and an effect of the invention] It is the print system equipped with the print control unit which changes the data which the print system according to claim 1 made in order to attain the purpose mentioned above intervenes between the information-processing terminal which generates the data for printing, the airline printer which performs printing to recorded media based on the data for printing, and an information-processing terminal and an airline printer, and serve as the candidate for printing at least into the data for printing which can process with an airline printer.

[0009] The amount prediction means of need [that a print control unit predicts the amount of need / of being the amount of ink required for printing / ink based on the data for / from an information processing terminal / printing] ink

An ink information-requirements means to require transmission of the ink information which is the information for checking the residue of the ink in the airline printer concerned from an airline printer. It has an ink information receiving means to receive the ink information transmitted from an airline printer. An airline printer It has an ink information management means to manage ink information, and an ink information transmitting means to transmit the ink information managed by the ink information management means if there is a Request to Send of the ink information by the ink information-requirements means.

[0010] Furthermore, based on the amount of need [that either / at least / the information processing terminal or the print control unit was predicted by the amount prediction means of need ink in advance of activation of the printing processing in an airline printer] ink, and the ink information received by the ink information receiving means, it has an amount information information means of ink are in the middle of activation of printing processing, and report directly or indirectly whether ink runs short.

[0011] The print system of this invention is equipped with the airline printer which are various printers [, such as terminals including information processing, and an ink jet printer, a laser beam printer,], such as a personal computer, a plotter, etc., and the print control unit which intervenes between an information processing terminal and an airline printer. This print control unit changes at least the data for [which was generated at the information processing terminal] printing into the data for printing which can be processed with an airline printer. An airline printer performs printing to recorded media based on this data for printing.

[0012] In the print system of this invention, the amount prediction means of need [of having] ink of a print control unit predicts the amount of need [of being the amount of ink required for printing] ink especially here based on the data for [from an information processing terminal] printing. For example, when an airline printer is a color printer, an initial complement is predicted for every color.

[0013] Moreover, in a print control unit, an ink information-requirements means requires transmission of ink information from an airline printer. According to this inquiry, an ink information transmitting means transmits the ink information managed by the ink information management means to a print control unit with an airline printer. Then, in a print control unit, an ink information receiving means receives the transmitted ink information.

[0014] In addition, ink information says the information for checking the residue of the ink in an airline printer. For example, you may be the ink residue itself or may be the consumption of the ink of the time of there being a Request to Send by the ink information-requirements means. When ink information is the consumption of ink, the amount of ink in the time of filling up ink is memorized, and an ink residue can be checked by subtracting the consumption of ink from this amount of ink. Then, the ink information management means which an airline printer has can consider detecting an ink residue at intervals of predetermined time, updating it, when for example, ink information is an ink residue, and accumulating the amount of ink used on the occasion of activation of printing processing when for example, ink information was ink consumption, and managing.

[0015] Furthermore, it is in the middle of activation of printing processing, and it reports directly or indirectly whether ink runs short based on the amount of need [that the amount information information means of ink which one / at least / equipment of an information-processing terminal or a print control unit has was predicted by the amount prediction means of need ink in advance of activation of the printing processing in an airline printer] ink, and the ink information received by the ink information receiving means. It is also considered that carrying out through vision using the display which used CRT, liquid crystal, etc. is also considered, and information carries out through an acoustic sense using synthesized speech etc.

[0016] Either [at least] the information processing terminal or the print control unit has the amount information information means of ink as mentioned above. Therefore, the information processing terminal may have, and the print control unit may have, or both equipments may have. In addition, when an information processing terminal has the amount information information means of ink, information which the amount information information means of ink mentioned above based on the amount of need [that it was transmitted to the information processing terminal and the amount of need / of having been acquired with the print control unit / ink, and the received ink information were transmitted from the print control unit] ink, and ink information will be performed.

[0017] Moreover, the case where reporting indirectly whether ink runs short displays for example, the amount of need ink and the ink residue based on ink information side by side corresponds. For example, it is condition of displaying the amount of need ink, and an ink residue in a graph. In this case, a user can know whether ink runs short by comparing the ink residue and the amount of need ink which were displayed.

[0018] reporting directly whether ink runs short on the other hand measures for example, the amount of need ink, and the ink residue based on ink information, and it runs short of ink – it is – it is – the case where the decision result of not running short is reported corresponds. It becomes unnecessary in this case, for a user to judge whether ink runs

short.

[0019] As the ink of an airline printer was printing processing, when it ran short conventionally, quality of printing could not be maintained but there was a case where redo of printing was needed. Especially, in oban printing, for example, printing of A0 size or the magnitude beyond it, if redo of such printing arises, the cost of recorded media or ink will increase.

[0020] On the other hand, in the print system of this invention, while a print control unit acquires the ink residue in an airline printer based on the ink information from an airline printer, the amount of need [that it is needed for printing processing] ink is predicted. And an information processing terminal or a print control unit is based on these ink information and the amount of need ink in the middle of printing, and it reports whether ink runs short in advance of activation of printing. Therefore, a user can fill up ink, before printing processing is started, as a result, is in the middle of printing, and can prevent that ink is lost.

[0021] In addition, the liquid ink which consists of a solvent the ink and the color which scoured and *(ed) the pigment by the oil or resin, water, or oily, the toner to which it is drawn in by the part with a charge and is fixed with heat, and an ink ribbon shall be included in the "ink" mentioned above. Moreover, when an airline printer is a color printer, it is possible to report whether ink runs short for every color, such as cyanogen, a Magenta, yellow, and black.

[0022] By the way, if the amount of need ink and the ink residue based on ink information are displayed side by side as mentioned above, a user will also be considered that it can judge the ink of which should be filled up from this display. However, more preferably, as shown in claim 2, when the ink residue and the amount of need ink based on ink information are measured and ink is insufficient, it is still better [the amount information information means of ink] to constitute so that the ullage of ink may be reported. If it does in this way, it will become unnecessary for the user itself to make judgment the ink of which must be filled up, and a user's convenience will improve.

[0023] Moreover, if it is the configuration which is understood whether the filled-up ink is truly sufficient after filling up ink, it is still more convenient for a user. Then, as shown in claim 3, an ink information-requirements means is good to constitute so that transmission of ink information may be repeatedly required at intervals of predetermined time.

[0024] When the ink information-requirements means required transmission of ink information repeatedly at intervals of predetermined time, as it mentioned above, an airline printer will transmit the managed ink information. If ink is filled up by the user at this time, the ink information after a supplement will be received by the ink information receiving means of a print control unit. Therefore, it reports whether the amount information information means of ink runs short of ink in the middle of printing processing based on the updated ink information. Consequently, it can check whether there is any filled-up enough ink truly, and is very convenient. Moreover, in a color printer, if it considers as such a configuration, for example even if it is the case where the ink of another color has been filled up by mistake when the ink of a certain color is insufficient, possibility of noticing the mistake will become high.

[0025] In addition, the amount prediction means of need ink of a print control unit predicts the amount of need [of being the amount of ink required for printing] ink based on the data for [from an information processing terminal] printing. For example, considering printing of general image data, the shade of the full color image with which 1 pixel is displayed on a screen by RGB with the brightness of 256 gradation is expressed by the airline printer by the dot pattern of the ink of four colors of cyanogen, a Magenta, yellow, and black. That is, the image on recorded media is expressed in this case in the dot by which ink is injected, and the dot which is not injected. At this time, a print control unit changes the image data which is data for printing into the data for printing whose 1 dot of a printing image is a bit map corresponding to 1 bit about each color. Therefore, if counting of the dot by which it is injected, "1", i.e., the ink, in this bit map data, is carried out, the amount of need ink can be predicted correctly.

[0026] However, when predicting the required amount of ink by such technique, much computation time will be required. Especially, although it is based also on operation speed when it calculates with a personal computer which a clock of operation calls several 100MHz in oban printing, for example, printing of A0 size or the magnitude beyond it, computation time which it says from several minutes is dozens of minutes may be required. That is, the forecasting method of the amount of ink which was mentioned above is because it has been actual printing processing and the same processing.

[0027] Then, as shown in claim 4, a print control unit is equipped with a preview data generation means to generate the preview data for a print preview, based on the data for [which was generated at the information processing terminal] printing, and, as for the amount prediction means of need ink, it is desirable to constitute based on the preview data generated by the preview data generation means, so that the amount of need ink may be predicted.

[0028] A print preview says checking a printing image on a screen, before actually performing printing to a record medium. Generally, the preview data generated for this purpose are contraction data of the image data which is data for printing, and only dilation ratios differ. Therefore, if the amount of need ink is predicted based on this preview data, the

time amount which prediction of the amount of ink takes can be shortened. This is explained below.

[0029] As shown in claim 5, the amount prediction means of need ink averages the gradation of each pixel of the image based on preview data, asks for the average concentration of the printing image corresponding to the averaged gradation concerned, and, specifically, can consider constituting so that the amount of ink which serves as the average concentration concerned in actual printing size may be predicted as an amount of need ink.

[0030] As mentioned above, the amount of ink will be proportional to a premise, then the gradation of image data about the shade of the image data displayed on a screen being expressed by recorded media as a dot pattern. Therefore, it is possible to average the gradation which each pixel of the image based on preview data has, to change it into the value to normalization, 0-1, and to consider as the average concentration of a printing image, and to make into the amount of need ink what applied the average concentration of this printing image to the amount of ink at the time of carrying out the solid coating of the actual printing size. [i.e.,] The number of pixels of the image based on the preview data used as the candidate for count can shorten the computation time which prediction of the amount of ink takes, if it does in this way, since it is small compared with the number of pixels of the image based on the data for printing.

[0031] Although the above has been explained as invention of a print system equipped with an information processing terminal, a print control unit, and an airline printer, it is also possible to realize as invention of the print control unit which is used for the system concerned and becomes effective. Namely, while performing printing to recorded media based on the information processing terminal which generates the data for printing, and the data for printing If there is : Request to Send of the ink information which is the information for checking an ink residue from the exterior In the print control unit which changes the data which are made to intervene between the airline printers which transmit the managed ink information, are used, and serve as a candidate for printing at least into the data for printing which can be processed with an airline printer The amount prediction means of need [of predicting the amount of need / of being the amount of ink required for printing / ink based on the data for / from an information processing terminal / printing] ink An ink information-requirements means to require transmission of ink information from an airline printer, An ink information receiving means to receive the ink information transmitted from an airline printer, In advance of activation of the printing processing in an airline printer, it is based on the amount of need [of having been predicted by the amount prediction means of need ink] ink, and the ink information received by the ink information receiving means. It is the print control unit characterized by having an amount information information means of ink to be in the middle of activation of printing processing, and to report directly or indirectly whether ink runs short.

[0032] In this case, explanation of an operation of the print control unit which can be set becomes being the same as that of what was mentioned above as an operation of the print control unit which constitutes the print system shown in claim 1. That is, the amount of need [of being the amount of ink for which the amount prediction means of need ink is needed by printing processing based on the data for printing] ink is predicted. Moreover, an ink information-requirements means requires transmission of ink information from an airline printer, and an ink information receiving means receives the ink information transmitted from an airline printer according to this. And based on the amount of need ink which the amount information information means of ink predicted in advance of activation of the printing processing in an airline printer, and the received ink information, it is in the middle of activation of printing processing and reports directly or indirectly whether the amounts of ink run short. Therefore, a user can fill up ink, before printing processing is started, as a result, is in the middle of printing, and can prevent that ink is lost.

[0033] Of course, when constitute or a print control unit generates [**** / constitute] the preview data for a print preview like the print control unit in the print system shown by claims 2, 3, and 4 so that an ink information-requirements means may require transmission of ink information repeatedly with a predetermined time interval so that the amount information information means of ink may report the ullage of ink, the amount prediction means of need ink can also constitute so that the amount of need ink may predict based on preview data.

[0034] In addition, although the print control unit mentioned above was a configuration by which self is equipped with the amount information information means of ink, it is good also as a configuration whose print control unit is equipped with an information transmitting means to replace with the amount information information means of ink, and to transmit the amount of need ink, and ink information to an information processing terminal. In this case, if an information processing terminal is the configuration of reporting whether it being in the middle of activation of printing processing, and ink running short based on the amount of need ink, and ink information in advance of activation of the printing processing in an airline printer, a user can fill up ink, before printing processing is started, as a result, is in the middle of printing, and can prevent that ink is lost.

[0035] By the way, in the print system shown in claim 5, it had the description at the point which predicts the amount of need ink. Therefore, if this description part is regarded as invention, the amount prediction approach of need [that it is shown in claim 8] ink can be considered. That is, it is the amount prediction approach of need [of predicting the

amount of ink which creates the preview data for a print preview, averages the gradation of each pixel of the image based on the created preview data concerned based on the data for / which was generated at the information-processing terminal / printing, asks for the average concentration of the printing image corresponding to the averaged gradation concerned, and serves as average concentration in actual printing size as an amount of need ink] ink. Since it becomes being the same as that of the explanation mentioned above as an operation of the amount prediction means of need ink in the print system shown in claim 5, the explanation about this approach is omitted here. The number of pixels of the image based on the preview data which serve as a candidate for count as mentioned above can shorten the time amount which prediction of the amount of ink takes, if the amount of need ink is predicted using such an approach, since it is small compared with the number of pixels of the image based on the data for printing.

[0036]

[Embodiment of the Invention] Hereafter, 1 operation gestalt which materialized this invention is explained with reference to a drawing. Drawing 1 is the explanatory view showing the outline configuration of the print system of this operation gestalt. The print system of this operation gestalt is a network system as shown in drawing 1. That is, through the networks 40, such as a Local Area Network, the terminal 10 as an "information processing terminal" and the raster image processor (henceforth "RIP") 20 as a "print control unit" are connected, and the printer 30 as an "airline printer" is connected to this RIP.

[0037] the system for oban printing whose print system of this operation gestalt prints the curtain for an advertisement etc. — it is — a printer 30 — 1.5m wide and the number of length — recorded media, such as 10m, are set. Therefore, in the print system of this operation gestalt, since the amount of processed data for printing becomes large, RIP20 which has a printing control function is prepared as another object in a terminal 10, and it has composition which mitigates the processing load of a terminal 10.

[0038] The terminal 10 is equipped with the display 11, the mouse 12, the keyboard 13, and the computer 14 for terminals. Moreover, RIP20 is similarly equipped with the display 21, the mouse 22, the keyboard 23, and the computer 24 for RIP. The computer 14 for terminals and the computer 24 for RIP are constituted as a computer system which made the principal part CPU, RAM and ROM which are not illustrated, the I/O circuit, the network interface, and the bus to which these are connected. And the displays 11 and 21 mentioned above, mice 12 and 22, and keyboards 13 and 23 are connected to the computer 14 for terminals, and the computer 24 for RIP through this I/O circuit, respectively. In addition, since the configuration of such a computer system is common knowledge, detailed configuration explanation is omitted.

[0039] The printer 30 is equipped with the print station which performs printing to recorded media, and the controlling mechanism which makes CPU, ROM, and RAM the principal part, and printing side processing later mentioned by this CPU is performed. In addition, a printer 30 is a color printer of an ink jet type, and color-prints in the ink of four colors of cyanogen, a Magenta, yellow, and black. Hereafter, four colors of cyanogen, a Magenta, yellow, and black are described to be also "CMYK."

[0040] A terminal 10 generates the data for [which are image data, such as TIFF and JPEG,] printing according to the directions from a user. And if there are printing directions from a user, the data for [this] printing will be transmitted to RIP20 through a network 40. Predetermined processing will be performed, the bit map data in which each dot of a printing image is shown will change the data for printing into the data for printing which can be processed in a printer 30 after that, and RIP20 will output them to a printer 30, if the data for printing are transmitted from a terminal 10. A printer 30 performs printing processing based on this data for printing, and the image based on the data for [which was transmitted from the terminal 10 as a result] printing is printed by recorded media. In addition, although it has the composition that a terminal 10 and one printer 30 were connected at a time, respectively, with this operation gestalt in order to avoid becoming complicated, you may be the configuration of having connected two or more sets of terminals to the network 40, and having connected two or more sets of printers to RIP20.

[0041] In the print system of this operation gestalt, it is characterized by reporting to a user whether the ink of a printer 30 runs short in the middle of printing in advance of activation of printing. Then, based on the flow chart shown in drawing 2 - drawing 5, the processing performed by RIP20 and the printer 30 is explained in order hereafter.

[0042] The printing setting processing performed in RIP20 by the beginning based on the flow chart of drawing 2 is explained. This printing setting processing is processing performed by CPU with which the computer 24 for RIP of RIP20 is equipped, and is processing performed in advance of printing.

[0043] In the first step S100, the preview data for a print preview are generated first. A print preview says checking a printing image on a screen, before actually performing printing to recorded media. Generally, the preview data generated for this purpose are contraction data of the image data which is data for printing, and only dilation ratios differ. Here, it is transmitted from a terminal 10, preview data are generated based on the image data as data for [which

was memorized by RAM of the computer 24 for RIP] printing, and the image based on the preview data is displayed on a display 21.

[0044] In S110, a printing setup by the user is performed based on the image displayed by S100. That is, a user performs a printing setup of rotation of the scaling which are expansion/contraction of printing size, the trimming which is selection of a printing field, and a printing image etc. through a mouse 22 or a keyboard 23 with reference to the image based on the preview data displayed on the display 21 with which RIP20 is equipped. And termination of a printing setup directs activation of printing. That is, although the data for [which was created at the terminal 10 as mentioned above] printing are transmitted to RIP20 with directions of the user through a terminal 10, through RIP20, a final printing setup by the user is made and activation of printing is directed.

[0045] The amount of need ink is predicted in S120 continuing. This processing predicts the amount of ink which is needed in printing of image data. Prediction of this amount of ink is performed with reference to a printing setup set up in S110 based on the preview data generated in S100.

[0046] Here, the prediction approach of the amount of need ink in this operation gestalt is explained. When printing the image based on image data to up to recorded media, the shade in the full color image with which 1 pixel is displayed on a screen by RGB with the brightness of 256 gradation is expressed by the dot pattern of the ink of four colors of CMYK, or is expressed by adjusting the injection capacity of the ink of four colors according to the gradation of image data. Although it is common to express the shade of an image in a dot pattern like the former since equipment becomes expensive by technique like the latter, the amount of ink will be proportional to the gradation of image data anyway.

[0047] Therefore, with this operation gestalt, the gradation which each pixel of the image based on preview data has is averaged, it is changed into the value to normalization, 0-1, and it considers as the average concentration of a printing image, and what applied the average concentration of this printing image to the amount of ink at the time of carrying out the solid coating of the actual printing size is computed as an amount of need ink. [i.e.,] In addition, when trimming is performed as a printing setup in above-mentioned S110, the average concentration of the printing image corresponding to a trimming part is computed by averaging and normalizing the gradation of the pixel corresponding to a trimming part. And let what applied this average concentration to the amount of ink at the time of carrying out the solid coating of the actual printing size corresponding to a trimming part be the amount of need ink. In addition, what is necessary is just to compute average concentration by technique which was mentioned above, after changing into the gradation in each of CMYK the gradation set up about each of RGB, when the image data on a screen is expressed by RGB and a printing image is expressed by CMYK.

[0048] Thus, with this operation gestalt, the amount of ink which is needed for printing based on preview data is predicted. It returns to the flow chart of drawing 2 again, and explanation of printing setting processing is continued. In S130, a printing setup set up by S110 and the amount of need [of having been predicted by S120] ink are memorized. Such information is memorized to the printing setting field prepared for RAM with which the computer 24 for RIP is equipped.

[0049] In S140 continuing, a printing beginning flag is turned off and this printing setting processing is ended after that. In addition, a printing beginning flag is the variable which can take two values, "ON" or "OFF", and is prepared for RAM of the computer 24 for RIP. Next, based on the flow chart shown in drawing 3, the amount information processing of ink performed in RIP20 is explained. This amount information processing of ink is also the printing setting processing mentioned above and the processing similarly performed by CPU with which the computer 24 for RIP of RIP20 is equipped.

[0050] In the first step S200, transmission of the ink residue in a printer 30 is first required from a printer 30. If an ink residue is transmitted from a printer 30 according to this Request to Send, the ink residue transmitted in S210 will be received. And in S220, an ink residue is displayed on the display 21 with which RIP20 is equipped. With this operation gestalt, graphical representation of the ink residue is carried out like the example of a screen display shown in drawing 6. In drawing 6, the ink residue is displayed on the field A of the central part of a screen, and it displays with the bar graph with which the gradation of 0,100 was shaken. Here, the field which gave the slash shows the residue of the ink of each color.

[0051] In S230, it judges whether a printing setup is memorized. As mentioned above, a printing setup by the user is made in advance of printing (S110 in drawing 2), and it memorizes to the printing setting field to which these contents of a setting were prepared for RAM of the computer 24 for RIP (S130 in drawing 2). Therefore, with reference to the printing setting field prepared for RAM of the computer 24 for RIP here, it judges whether a printing setup by the user is memorized. When a printing setup is memorized here (S230: YES), it shifts to S240. On the other hand, when the printing setup is not memorized (S230: NO), it shifts to S290.

[0052] In S240, the amount of need [that RAM of the computer 24 for RIP memorized] ink is read. And the amount of

need ink read into the display 21 with which RIP20 is equipped in S250 is displayed. In this operation gestalt, as shown in the example of a screen display of drawing 6, the amount of need ink is displayed by the mark of the triangle which shows the location on a graph to the bar graph which shows the amount of ink displayed on Field A. That is, in drawing 6, since the slash field in a bar graph shows the ink residue, when the location shown by the mark of this triangle has crossed the slash field (i.e., when it is in the side near the graduation of "100"), ink will run short. Therefore, the display screen shown in drawing 6 shows running short about the ink of black, although it does not run short about the ink of cyanogen, a Magenta, and yellow.

[0053] In S260, it judges whether ink runs short. It judges whether this processing measures the ink residue received in S210, and the amount of need ink read from RAM of the computer 24 for RIP in S240 for every color, and runs short of ink. When it is judged that ink runs short here (S260:YES), the purport which runs short of ink in S270 is displayed on the display 21 of RIP20, and it shifts to S300 after that. On the other hand, when it is judged that ink does not run short (S260:NO), a printing beginning flag is turned ON in S280, and it shifts to S300 after that.

[0054] The display of the purport which runs short of the ink performed in S270 is displayed on the field B different from graphical representation, as shown in drawing 6. In drawing 6, since the ink of black is insufficient, the message "the ink of black runs short" is outputted.

[0055] Moreover, the display of the amount of need ink is cleared in S290 which shifts when negative judgment is carried out by S230. This processing is performed when negative judgment is carried out by S230 (i.e., when the printing setup is not memorized to the printing setting field prepared for RAM of the computer 24 for RIP), but the information memorized to the printing setting field is deleted after transmission of the data for printing to a printer 30 so that it may mention later. That is, when printing is started by the printer 30, since the display of the amount of need ink becomes unnecessary, it clears the display of the amount of need ink. Then, it shifts to S300.

[0056] In S300, it judges whether predetermined time which it says, for example is 3 seconds passed. When it is judged that predetermined time passed here (S300:YES), the processing from S200 is repeated. On the other hand, before predetermined time passes, (S300:NO) and this decision processing are repeated. If the Request to Send of an ink residue will be performed at intervals of predetermined time to a printer 30 (S200) and, as for RIP20, a user fills up ink a screen display will also be updated by this processing of S300 according to it.

[0057] Next, based on the flow chart of drawing 4, the printing control processing in RIP20 is explained. This printing control processing is also performed by CPU of the computer 24 for RIP with which RIP20 is equipped, and is performed following the printing setting processing which mentioned above using drawing 2.

[0058] In the first step S400, it judges first whether a printing beginning flag is ON. When a printing beginning flag is ON here (S400:YES), it shifts to S410. On the other hand, before a printing beginning flag serves as ON, when (S400:NO, i.e., a printing beginning flag) is OFF, this decision processing is repeated.

[0059] In S410, the image data as data a printing setup memorized by RAM of the computer 24 for RIP and for printing is read. And the image data read in S420 based on the printing setup is changed into the data for printing in which printing processing is possible by the printer 30.

[0060] And in S430, the data for printing are transmitted to a printer 30. By this transmitting processing of S430, by the printer 30, printing to recorded media is performed so that it may mention later. In S440, a printing setup which cleared the printing setting field, namely, was memorized is deleted, and this printing control processing is ended after that. By clearing a printing setting field, negative judgment will be carried out by S230 in the amount information processing of ink shown in drawing 3.

[0061] Although the processing explained above is the processing performed in RIP20 next, the printing side processing performed in a printer 30 corresponding to the processing mentioned above is explained based on the flow chart of drawing 5. In the first step S500, it judges first whether data were received from RIP20. When it is judged that data were received from RIP here (S500:YES), it shifts to S510. On the other hand, before receiving data from RIP20, (S500:NO) and this decision processing are repeated. That is, processing after S510 will not be performed without receiving a certain data from RIP20.

[0062] The data received from RIP20 are analyzed in S510. And in S520 continuing, branching processing based on the analysis result of data is performed. When the data from RIP20 are the Request to Send of an ink residue, it shifts to S530. This is the case where the data transmitted by the processing of S200 shown in drawing 3 are judged. At this time, the ink residue which detected the ink residue in S530 and was detected in S540 is transmitted to RIP20. In RIP20, the processing of S210 in drawing 3 will receive the transmitted ink residue. Then, this printing side processing is ended.

[0063] When the data from RIP20 are data for printing, it shifts to S550. This is the case where the data transmitted by the processing of S430 shown in drawing 4 are judged. At this time, printing to recorded media is performed in S550

based on the received amount data of printings. Then, this printing side processing is ended.

[0064] When the data from RIP20 are not the Request to Send or the amount data of printings of an ink residue, either, in S560, corresponding to the received data, processing is performed and this printing side processing is ended after that. Next, the effectiveness which the print system of this operation gestalt demonstrates is explained. In addition, in order to make an understanding of explanation here easy, the conventional trouble is explained first.

[0065] As the ink of a printer 30 was printing, when it ran short in the print system conventionally, quality of printing could not be maintained but there was a case where redo of printing was needed. Especially, in oban printing, for example, printing of A0 size or the magnitude beyond it, if redo of such printing arises, the cost of recorded media or ink will increase.

[0066] On the other hand, in the print system of this operation gestalt, if there are printing activation directions from a user (S110 in drawing 2), a printing beginning flag will be turned off (S140 in drawing 2), and printing will be made not to perform (S400:NO in drawing 4). RIP20 requires transmission of the ink residue in a printer 30 (S200 in drawing 3), and receives the ink residue transmitted from a printer 30 according to this demand (S210 in drawing 3). Moreover, in RIP20, the amount of need [of being the amount of ink which is needed by the printer 30 in printing] ink is predicted based on a printing setup from the data and the user for [which is transmitted from a terminal 10] printing (S120 in drawing 2). And the ink residue received from the printer 30 and the predicted amount of need ink are indicated by comparison using a graph for every ink of each color (refer to S220 and S250 in drawing 3 R> 3, and drawing 6). That is, in advance of activation of printing, it displays in the condition that an ink residue and the amount of need ink can be measured. Moreover, an ink residue and the amount of need ink are measured (S260 in drawing 3), and when ink runs short, (S260: YES in drawing 3) and that are displayed (S270 in drawing 3). By this, a user can fill up ink, before printing processing is started, as a result, is in the middle of printing, and can prevent that ink is lost.

[0067] Moreover, by the print system of this operation gestalt, RIP20 performs the Request to Send of an ink residue with a predetermined time interval (S300: YES in drawing 3, S200). Therefore, if ink is filled up by the user after the display of the purport which runs short of ink is made, the ink residue after a supplement will be received (S210 in drawing 3). Therefore, after an updating indication of the ink residue is given (S220 in drawing 3) and ink is filled up, it is judged anew whether ink runs short in the middle of printing processing (S260 in drawing 3). Consequently, it can check whether the filled-up ink is truly sufficient, and is very convenient for a user. Moreover, since a printer 30 is a color printer as mentioned above, for example, even if it is the case where the ink of another color has been filled up by mistake when the ink of a certain color is insufficient, possibility of noticing the mistake becomes high.

[0068] Although RIP20 predicts the amount of need ink in the print system of this operation gestalt further again based on a printing setup from the data and the user for [which is transmitted from a terminal 10] printing, at this time, preview data are generated from the data for printing (S100 in drawing 2), and the amount of need ink is predicted based on this preview data (S120 in drawing 2). That is, since it is small compared with the number of pixels of the image based on the data for printing, the number of pixels of the image based on the preview data used as the candidate for count can shorten the computation time which prediction of the amount of ink takes.

[0069] In addition, CPU of the computer 24 for RIP with which RIP20 of this operation gestalt is equipped is equivalent to "the amount prediction means of need ink", an "ink information-requirements means", an "ink information receiving means", and a "preview data generation means", and this display 21 with which CPU and RIP20 are equipped is equivalent to "the amount information information means of ink."

[0070] And the processing of S100 in the printing setting processing shown in drawing 2 is equivalent to the processing as a preview data generation means, and processing of 120 is equivalent to the processing as an amount prediction means of need ink. Moreover, the processing of S200 and S300 in the amount information processing of ink shown in drawing 3 is equivalent to the processing as an ink information-requirements means, and processing of S210 is equivalent to the processing as an ink information receiving means. Furthermore, the processing of S220-S270 in drawing 3 is equivalent to the processing as an amount information information means of ink.

[0071] Moreover, the processing of S530 in the printing side processing shown in drawing 5 is equivalent to the processing as an ink information management means, and processing of S540 is equivalent to the processing as an ink information transmitting means. As mentioned above, this invention is not limited to such an operation gestalt at all, and can be carried out with the gestalt which becomes various in the range which does not deviate from the main point of this invention.

[0072] For example, with the above-mentioned operation gestalt, although it was the configuration which displays the information on the amount of ink on the display 21 of RIP20, displaying on the display 11 of a terminal 10 is also considered. In that case, replace with the processing of S220 in drawing 3, and an ink residue is considered as the configuration transmitted to a terminal 10. Furthermore, replacing with the processing of S250 in drawing 3,

considering the amount of need ink as the configuration transmitted to a terminal 10, and considering as the configuration whose terminal 10 performs the same processing as S260-S280 in drawing 3 based on the ink residue and the amount of need ink which were transmitted from RIP20 is considered as an example. What is necessary is to prepare the printing beginning flag in processing of S280 for RAM of the computer 24 for RIP with which RIP20 is equipped, and just to make it output the signal which directs ON or OFF of this printing beginning flag from a terminal 10 to RIP20 at this time. Speaking a little more concretely, having the program which has Web server ability in the computer 20 for RIP, and having the program which has a web browser function in a terminal 10. In the web browser which operates at a terminal 10, the JAVA program which displays a graph as shown by drawing 6 R> 6 is performed. On the other hand, the Web server in the computer 20 for RIP transmits the amount of need ink, and an ink residue to a web browser periodically. The JAVA program executed by the web browser which operates at a terminal 10 receives the amount of ink and ink residue which were transmitted from the Web server in the computer 20 for RIP, and realizes the same function as S260 to S280 in drawing 3 based on these. In addition, displaying the amount information of ink, of course on both the display 21 of RIP20 and the display 11 of a terminal 10 is also considered.

[0073] In addition, although the ink residue and the amount of need ink were expressed as the above-mentioned operation gestalt as a display format to the display 21 of RIP20 using the graph of 1 for every ink of each color as shown in drawing 6, the graph corresponding to an ink residue and the amount of need ink is displayed [each], or, of course, displaying an ink residue and the amount of need ink as a numeric value is also considered.

[0074] Moreover, if the amount of need ink and the ink residue based on ink information are displayed side by side by the graph or the numeric value, when an ink residue and the amount of need ink are measured and ink is insufficient, it is still better [a user], although it may be able to judge the ink of which should be filled up from this display to constitute so that the ullage of ink may be reported. If it does in this way, it will become unnecessary for the user itself to make judgment the ink of which must be filled up, and improvement in convenience will be achieved.

[0075] Although he was trying for RIP20 to receive the ink residue which requires transmission of an ink residue and is transmitted from a printer 30 to a printer 30 with the above-mentioned operation gestalt further again, in RIP20, the ink residue in a printer 30 should just be known as a result. It follows, for example, a printer 30 accumulates the consumption of the ink from an ink supplement point in time, and you may make it transmit. In this case, in RIP20, if the amount of ink at the ink supplement time is memorized, an ink residue is computable by subtracting ink consumption from this amount of ink.

[0076] moreover, although the above-mentioned operation gestalt be a configuration for the ink jet-type printer 30, it be [whether the technical thought of this invention run short of ink, and] in the point report to a user before activation of printing, and it be this semantics and this invention may be apply to the laser beam printer using the toner to which it be draw in by the part with a charge and be fix with a heat, and the printer using an ink ribbon.

[0077] In addition, with the above-mentioned operation gestalt, in case the amount of need ink is predicted, preview data are generated from the data for printing, and the amount of need ink is predicted based on this preview data. In order to calculate the gradation of the image based on preview data to coincidence and to ask it for the average concentration of a printing image as a result although the time amount which prediction of the amount of need ink take can be shortened as mentioned above, it is advantageous also at the point that the amount of need ink is calculated with a certain amount of accuracy. That is, the computation time and correctness at the time of calculating the amount of need ink can be said to be that the above-mentioned approach takes the balance of the both into consideration the place which is an opposite matter.

[0078] By the way, when only compaction of the time amount taken to predict the amount of need ink is thought as important, it is possible to use technique as shown below.

****** Relate to the approach and this which predict the amount of ink at the time of carrying out the solid coating of the actual printing size as an amount of need ink, and it is the concentration (the rate of a dot that ink is injected to all the dots of printing size is said.) of the printing image of ****** past. It is below the same. It averages and how to predict what applied this maximum concentration to the amount of ink the approach of predicting what applied this concentration to the amount of ink at the time of carrying out the solid coating of the actual printing size as an amount of need ink, and at the time of memorizing the maximum concentration of the printing image of ****** past further, and carrying out the solid coating of the actual printing size as an amount of need ink etc. can be considered. By the approach of these ****s** - ******, since concentration of a printing image is not calculated in prediction, compaction of the time amount which prediction takes is realizable.

[0079] On the contrary, when the accuracy at the time of calculating the amount of need ink is thought as important, it is possible to use technique as shown below. When a printer 30 prints the shade of an image in a dot pattern, RIP20 changes the image data which is data for printing into the data for printing whose 1 dot of a printing image is a bit map

corresponding to 1 bit about each color. Therefore, how to carry out counting of the dot by which it is injected, "1", i.e. the ink, in this bit map data, and predict the amount of need ink can be considered. If it does in this way, the amount of need ink can be predicted correctly.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the technique of grasping lack of the ink in the airline printer connected to the print control unit before printing processing activation.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Conventionally, the print system which prints the data for [which was created at the information processing terminal] printing with an airline printer is known. In this system, the print control unit called RIP (Raster Image Processor) for changing the data for printing into the data for printing which can be processed with an airline printer will intervene between an information processing terminal and an airline printer. That is, the data for printing are PDL (Page Description Language), such as PostScript, or since it is image data, such as TIFF and JPEG, the inverter to the data for printing which can be processed with an airline printer is usually needed.

[0003] A thing equipped with the function as this print control unit also has an information processing terminal with a small-scale system, for example, a personal system. On the other hand, the configuration which connects a print control unit with an information processing terminal on a network as another object for the purpose of the processing unloading of an information processing terminal is adopted with the large-scale system, for example, the system built as a network. It is condition of transmitting the data for printing to the airline printer which changed the data for [that] printing into the data for printing, and was connected when the print control unit was received through an information processing terminal to the network at this time.

[Translation done.]

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EFFECT OF THE INVENTION

[The means for solving a technical problem and an effect of the invention] It is the print system equipped with the print control unit which changes the data which the print system according to claim 1 made in order to attain the purpose mentioned above intervenes between the information-processing terminal which generates the data for printing, the airline printer which performs printing to recorded media based on the data for printing, and an information-processing terminal and an airline printer, and serve as the candidate for printing at least into the data for printing which can process with an airline printer.

[0009] The amount prediction means of need [that a print control unit predicts the amount of need / of being the amount of ink required for printing / ink based on the data for / from an information processing terminal / printing] ink An ink information-requirements means to require transmission of the ink information which is the information for checking the residue of the ink in the airline printer concerned from an airline printer, It has an ink information receiving means to receive the ink information transmitted from an airline printer. An airline printer It has an ink information management means to manage ink information, and an ink information transmitting means to transmit the ink information managed by the ink information management means if there is a Request to Send of the ink information by the ink information-requirements means.

[0010] Furthermore, based on the amount of need [that either / at least / the information processing terminal or the print control unit was predicted by the amount prediction means of need ink in advance of activation of the printing processing in an airline printer] ink, and the ink information received by the ink information receiving means, it has an amount information information means of ink are in the middle of activation of printing processing, and report directly or indirectly whether ink runs short.

[0011] The print system of this invention is equipped with the airline printer which are various printers [, such as terminals including information processing, and an ink jet printer, a laser beam printer,], such as a personal computer, a plotter, etc., and the print control unit which intervenes between an information processing terminal and an airline printer. This print control unit changes at least the data for [which was generated at the information processing terminal] printing into the data for printing which can be processed with an airline printer. An airline printer performs printing to recorded media based on this data for printing.

[0012] In the print system of this invention, the amount prediction means of need [of having] ink of a print control unit predicts the amount of need [of being the amount of ink required for printing] ink especially here based on the data for [from an information processing terminal] printing. For example, when an airline printer is a color printer, an initial complement is predicted for every color.

[0013] Moreover, in a print control unit, an ink information-requirements means requires transmission of ink information from an airline printer. According to this inquiry, an ink information transmitting means transmits the ink information managed by the ink information management means to a print control unit with an airline printer. Then, in a print control unit, an ink information receiving means receives the transmitted ink information.

[0014] In addition, ink information says the information for checking the residue of the ink in an airline printer. For example, you may be the ink residue itself or may be the consumption of the ink of the time of there being a Request to Send by the ink information-requirements means. When ink information is the consumption of ink, the amount of ink in the time of filling up ink is memorized, and an ink residue can be checked by subtracting the consumption of ink from this amount of ink. Then, the ink information management means which an airline printer has can consider detecting an ink residue at intervals of predetermined time, updating it, when for example, ink information is an ink residue, and accumulating the amount of ink used on the occasion of activation of printing processing when for example, ink information was ink consumption, and managing.

[0015] Furthermore, it is in the middle of activation of printing processing, and it reports directly or indirectly whether

ink runs short based on the amount of need [that the amount information information means of ink which one / at least / equipment of an information-processing terminal or a print control unit has was predicted by the amount prediction means of need ink in advance of activation of the printing processing in an airline printer] ink, and the ink information received by the ink information receiving means. It is also considered that carrying out through vision using the display which used CRT, liquid crystal, etc. is also considered, and information carries out through an acoustic sense using synthesized speech etc.

[0016] Either [at least] the information processing terminal or the print control unit has the amount information information means of ink as mentioned above. Therefore, the information processing terminal may have, and the print control unit may have, or both equipments may have. In addition, when an information processing terminal has the amount information information means of ink, information which the amount information information means of ink mentioned above based on the amount of need [that it was transmitted to the information processing terminal and the amount of need / of having been acquired with the print control unit / ink, and the received ink information were transmitted from the print control unit] ink, and ink information will be performed.

[0017] Moreover, the case where reporting indirectly whether ink runs short displays for example, the amount of need ink and the ink residue based on ink information side by side corresponds. For example, it is condition of displaying the amount of need ink, and an ink residue in a graph. In this case, a user can know whether ink runs short by comparing the ink residue and the amount of need ink which were displayed.

[0018] reporting directly whether ink runs short on the other hand measures for example, the amount of need ink, and the ink residue based on ink information, and it runs short of ink – it is – it is – the case where the decision result of not running short is reported corresponds. It becomes unnecessary in this case, for a user to judge whether ink runs short.

[0019] As the ink of an airline printer was printing processing, when it ran short conventionally, quality of printing could not be maintained but there was a case where redo of printing was needed. Especially, in oban printing, for example, printing of A0 size or the magnitude beyond it, if redo of such printing arises, the cost of recorded media or ink will increase.

[0020] On the other hand, in the print system of this invention, while a print control unit acquires the ink residue in an airline printer based on the ink information from an airline printer, the amount of need [that it is needed for printing processing] ink is predicted. And an information processing terminal or a print control unit is based on these ink information and the amount of need ink in the middle of printing, and it reports whether ink runs short in advance of activation of printing. Therefore, a user can fill up ink, before printing processing is started, as a result, is in the middle of printing, and can prevent that ink is lost.

[0021] In addition, the liquid ink which consists of a solvent the ink and the color which scoured and *(ed) the pigment by the oil or resin, water, or oily, the toner to which it is drawn in by the part with a charge and is fixed with heat, and an ink ribbon shall be included in the "ink" mentioned above. Moreover, when an airline printer is a color printer, it is possible to report whether ink runs short for every color, such as cyanogen, a Magenta, yellow, and black.

[0022] By the way, if the amount of need ink and the ink residue based on ink information are displayed side by side as mentioned above, a user will also be considered that it can judge the ink of which should be filled up from this display. However, more preferably, as shown in claim 2, when the ink residue and the amount of need ink based on ink information are measured and ink is insufficient, it is still better [the amount information information means of ink] to constitute so that the ullage of ink may be reported. If it does in this way, it will become unnecessary for the user itself to make judgment the ink of which must be filled up, and a user's convenience will improve.

[0023] Moreover, if it is the configuration which is understood whether the filled-up ink is truly sufficient after filling up ink, it is still more convenient for a user. Then, as shown in claim 3, an ink information-requirements means is good to constitute so that transmission of ink information may be repeatedly required at intervals of predetermined time.

[0024] When the ink information-requirements means required transmission of ink information repeatedly at intervals of predetermined time, as it mentioned above, an airline printer will transmit the managed ink information. If ink is filled up by the user at this time, the ink information after a supplement will be received by the ink information receiving means of a print control unit. Therefore, it reports whether the amount information information means of ink runs short of ink in the middle of printing processing based on the updated ink information. Consequently, it can check whether there is any filled-up enough ink truly, and is very convenient. Moreover, in a color printer, if it considers as such a configuration, for example even if it is the case where the ink of another color has been filled up by mistake when the ink of a certain color is insufficient, possibility of noticing the mistake will become high.

[0025] In addition, the amount prediction means of need ink of a print control unit predicts the amount of need [of being the amount of ink required for printing] ink based on the data for [from an information processing terminal]

printing. For example, considering printing of general image data, the shade of the full color image with which 1 pixel is displayed on a screen by RGB with the brightness of 256 gradation is expressed by the airline printer by the dot pattern of the ink of four colors of cyanogen, a Magenta, yellow, and black. That is, the image on recorded media is expressed in this case in the dot by which ink is injected, and the dot which is not injected. At this time, a print control unit changes the image data which is data for printing into the data for printing whose 1 dot of a printing image is a bit map corresponding to 1 bit about each color. Therefore, if counting of the dot by which it is injected, "1", i.e., the ink, in this bit map data, is carried out, the amount of need ink can be predicted correctly.

[0026] However, when predicting the required amount of ink by such technique, much computation time will be required. Especially, although it is based also on operation speed when it calculates with a personal computer which a clock of operation calls several 100MHz in oban printing, for example, printing of A0 size or the magnitude beyond it, computation time which it says from several minutes is dozens of minutes may be required. That is, the forecasting method of the amount of ink which was mentioned above is because it has been actual printing processing and the same processing.

[0027] Then, as shown in claim 4, a print control unit is equipped with a preview data generation means to generate the preview data for a print preview, based on the data for [which was generated at the information processing terminal] printing, and, as for the amount prediction means of need ink, it is desirable to constitute based on the preview data generated by the preview data generation means, so that the amount of need ink may be predicted.

[0028] A print preview says checking a printing image on a screen, before actually performing printing to a record medium. Generally, the preview data generated for this purpose are contraction data of the image data which is data for printing, and only dilation ratios differ. Therefore, if the amount of need ink is predicted based on this preview data, the time amount which prediction of the amount of ink takes can be shortened. This is explained below.

[0029] As shown in claim 5, the amount prediction means of need ink averages the gradation of each pixel of the image based on preview data, asks for the average concentration of the printing image corresponding to the averaged gradation concerned, and, specifically, can consider constituting so that the amount of ink which serves as the average concentration concerned in actual printing size may be predicted as an amount of need ink.

[0030] As mentioned above, the amount of ink will be proportional to a premise, then the gradation of image data about the shade of the image data displayed on a screen being expressed by recorded media as a dot pattern. Therefore, it is possible to average the gradation which each pixel of the image based on preview data has, to change it into the value to normalization, 0-1, and to consider as the average concentration of a printing image, and to make into the amount of need ink what applied the average concentration of this printing image to the amount of ink at the time of carrying out the solid coating of the actual printing size. [i.e.,] The number of pixels of the image based on the preview data used as the candidate for count can shorten the computation time which prediction of the amount of ink takes, if it does in this way, since it is small compared with the number of pixels of the image based on the data for printing.

[0031] Although the above has been explained as invention of a print system equipped with an information processing terminal, a print control unit, and an airline printer, it is also possible to realize as invention of the print control unit which is used for the system concerned and becomes effective. Namely, while performing printing to recorded media based on the information processing terminal which generates the data for printing, and the data for printing If there is : Request to Send of the ink information which is the information for checking an ink residue from the exterior In the print control unit which changes the data which are made to intervene between the airline printers which transmit the managed ink information, are used, and serve as a candidate for printing at least into the data for printing which can be processed with an airline printer The amount prediction means of need [of predicting the amount of need / of being the amount of ink required for printing / ink based on the data for / from an information processing terminal / printing] ink An ink information-requirements means to require transmission of ink information from an airline printer, An ink information receiving means to receive the ink information transmitted from an airline printer, In advance of activation of the printing processing in an airline printer, it is based on the amount of need [of having been predicted by the amount prediction means of need ink] ink, and the ink information received by the ink information receiving means. It is the print control unit characterized by having an amount information information means of ink to be in the middle of activation of printing processing, and to report directly or indirectly whether ink runs short.

[0032] In this case, explanation of an operation of the print control unit which can be set becomes being the same as that of what was mentioned above as an operation of the print control unit which constitutes the print system shown in claim 1. That is, the amount of need [of being the amount of ink for which the amount prediction means of need ink is needed by printing processing based on the data for printing] ink is predicted. Moreover, an ink information-requirements means requires transmission of ink information from an airline printer, and an ink information receiving means receives the ink information transmitted from an airline printer according to this. And based on the amount of

need ink which the amount information information means of ink predicted in advance of activation of the printing processing in an airline printer, and the received ink information, it is in the middle of activation of printing processing and reports directly or indirectly whether the amounts of ink run short. Therefore, a user can fill up ink, before printing processing is started, as a result, is in the middle of printing, and can prevent that ink is lost.

[0033] Of course, when constitute or a print control unit generates [**** / constitute] the preview data for a print preview like the print control unit in the print system shown by claims 2, 3, and 4 so that an ink information-requirements means may require transmission of ink information repeatedly with a predetermined time interval so that the amount information information means of ink may report the ullage of ink, the amount prediction means of need ink can also constitute so that the amount of need ink may predict based on preview data.

[0034] In addition, although the print control unit mentioned above was a configuration by which self is equipped with the amount information information means of ink, it is good also as a configuration whose print control unit is equipped with an information transmitting means to replace with the amount information information means of ink, and to transmit the amount of need ink, and ink information to an information processing terminal. In this case, if an information processing terminal is the configuration of reporting whether it being in the middle of activation of printing processing, and ink running short based on the amount of need ink, and ink information in advance of activation of the printing processing in an airline printer, a user can fill up ink, before printing processing is started, as a result, is in the middle of printing, and can prevent that ink is lost.

[0035] By the way, in the print system shown in claim 5, it had the description at the point which predicts the amount of need ink. Therefore, if this description part is regarded as invention, the amount prediction approach of need [that it is shown in claim 8] ink can be considered. That is, it is the amount prediction approach of need [of predicting the amount of ink which creates the preview data for a print preview, averages the gradation of each pixel of the image based on the created preview data concerned based on the data for / which was generated at the information-processing terminal / printing, asks for the average concentration of the printing image corresponding to the averaged gradation concerned, and serves as average concentration in actual printing size as an amount of need ink] ink. Since it becomes being the same as that of the explanation mentioned above as an operation of the amount prediction means of need ink in the print system shown in claim 5, the explanation about this approach is omitted here. The number of pixels of the image based on the preview data which serve as a candidate for count as mentioned above can shorten the time amount which prediction of the amount of ink takes, if the amount of need ink is predicted using such an approach, since it is small compared with the number of pixels of the image based on the data for printing.

[0036]

[Embodiment of the Invention] Hereafter, 1 operation gestalt which materialized this invention is explained with reference to a drawing. Drawing 1 is the explanatory view showing the outline configuration of the print system of this operation gestalt. The print system of this operation gestalt is a network system as shown in drawing 1. That is, through the networks 40, such as a Local Area Network, the terminal 10 as an "information processing terminal" and the raster image processor (henceforth "RIP") 20 as a "print control unit" are connected, and the printer 30 as an "airline printer" is connected to this RIP.

[0037] the system for oban printing whose print system of this operation gestalt prints the curtain for an advertisement etc. — it is — a printer 30 — 1.5m wide and the number of length — recorded media, such as 10m, are set. Therefore, in the print system of this operation gestalt, since the amount of processed data for printing becomes large, RIP20 which has a printing control function is prepared as another object in a terminal 10, and it has composition which mitigates the processing load of a terminal 10.

[0038] The terminal 10 is equipped with the display 11, the mouse 12, the keyboard 13, and the computer 14 for terminals. Moreover, RIP20 is similarly equipped with the display 21, the mouse 22, the keyboard 23, and the compute 24 for RIP. The computer 14 for terminals and the computer 24 for RIP are constituted as a computer system which made the principal part CPU, RAM and ROM which are not illustrated, the I/O circuit, the network interface, and the bus to which these are connected. And the displays 11 and 21 mentioned above, mice 12 and 22, and keyboards 13 and 23 are connected to the computer 14 for terminals, and the computer 24 for RIP through this I/O circuit, respectively. In addition, since the configuration of such a computer system is common knowledge, detailed configuration explanation is omitted.

[0039] The printer 30 is equipped with the print station which performs printing to recorded media, and the controlling mechanism which makes CPU, ROM, and RAM the principal part, and printing side processing later mentioned by this CPU is performed. In addition, a printer 30 is a color printer of an ink jet type, and color-prints in the ink of four colors of cyanogen, a Magenta, yellow, and black. Hereafter, four colors of cyanogen, a Magenta, yellow, and black are described to be also "CMYK."

[0040] A terminal 10 generates the data for [which are image data, such as TIFF and JPEG,] printing according to the directions from a user. And if there are printing directions from a user, the data for [this] printing will be transmitted to RIP20 through a network 40. Predetermined processing will be performed, the bit map data in which each dot of a printing image is shown will change the data for printing into the data for printing which can be processed in a printer 30 after that, and RIP20 will output them to a printer 30, if the data for printing are transmitted from a terminal 10. A printer 30 performs printing processing based on this data for printing, and the image based on the data for [which was transmitted from the terminal 10 as a result] printing is printed by recorded media. In addition, although it has the composition that a terminal 10 and one printer 30 were connected at a time, respectively, with this operation gestalt in order to avoid becoming complicated, you may be the configuration of having connected two or more sets of terminals to the network 40, and having connected two or more sets of printers to RIP20.

[0041] In the print system of this operation gestalt, it is characterized by reporting to a user whether the ink of a printer 30 runs short in the middle of printing in advance of activation of printing. Then, based on the flow chart shown in drawing 2 - drawing 5, the processing performed by RIP20 and the printer 30 is explained in order hereafter.

[0042] The printing setting processing performed in RIP20 by the beginning based on the flow chart of drawing 2 is explained. This printing setting processing is processing performed by CPU with which the computer 24 for RIP of RIP20 is equipped, and is processing performed in advance of printing.

[0043] In the first step S100, the preview data for a print preview are generated first. A print preview says checking a printing image on a screen, before actually performing printing to recorded media. Generally, the preview data generated for this purpose are contraction data of the image data which is data for printing, and only dilation ratios differ. Here, it is transmitted from a terminal 10, preview data are generated based on the image data as data for [which was memorized by RAM of the computer 24 for RIP] printing, and the image based on the preview data is displayed on a display 21.

[0044] In S110, a printing setup by the user is performed based on the image displayed by S100. That is, a user performs a printing setup of rotation of the scaling which are expansion/contraction of printing size, the trimming which is selection of a printing field, and a printing image etc. through a mouse 22 or a keyboard 23 with reference to the image based on the preview data displayed on the display 21 with which RIP20 is equipped. And termination of a printing setup directs activation of printing. That is, although the data for [which was created at the terminal 10 as mentioned above] printing are transmitted to RIP20 with directions of the user through a terminal 10, through RIP20, a final printing setup by the user is made and activation of printing is directed.

[0045] The amount of need ink is predicted in S120 continuing. This processing predicts the amount of ink which is needed in printing of image data. Prediction of this amount of ink is performed with reference to a printing setup set up in S110 based on the preview data generated in S100.

[0046] Here, the prediction approach of the amount of need ink in this operation gestalt is explained. When printing the image based on image data to up to recorded media, the shade in the full color image with which 1 pixel is displayed on a screen by RGB with the brightness of 256 gradation is expressed by the dot pattern of the ink of four colors of CMYK, or is expressed by adjusting the injection capacity of the ink of four colors according to the gradation of image data. Although it is common to express the shade of an image in a dot pattern like the former since equipment becomes expensive by technique like the latter, the amount of ink will be proportional to the gradation of image data anyway.

[0047] Therefore, with this operation gestalt, the gradation which each pixel of the image based on preview data has is averaged, it is changed into the value to normalization, 0-1, and it considers as the average concentration of a printing image, and what applied the average concentration of this printing image to the amount of ink at the time of carrying out the solid coating of the actual printing size is computed as an amount of need ink. [i.e.,] In addition, when trimming is performed as a printing setup in above-mentioned S110, the average concentration of the printing image corresponding to a trimming part is computed by averaging and normalizing the gradation of the pixel corresponding to a trimming part. And let what applied this average concentration to the amount of ink at the time of carrying out the solid coating of the actual printing size corresponding to a trimming part be the amount of need ink. In addition, what is necessary is just to compute average concentration by technique which was mentioned above, after changing into the gradation in each of CMYK the gradation set up about each of RGB, when the image data on a screen is expressed by RGB and a printing image is expressed by CMYK.

[0048] Thus, with this operation gestalt, the amount of ink which is needed for printing based on preview data is predicted. It returns to the flow chart of drawing 2 again, and explanation of printing setting processing is continued. In S130, a printing setup set up by S110 and the amount of need [of having been predicted by S120] ink are memorized. Such information is memorized to the printing setting field prepared for RAM with which the computer 24 for RIP is equipped.

[0049] In S140 continuing, a printing beginning flag is turned off and this printing setting processing is ended after that. In addition, a printing beginning flag is the variable which can take two values, "ON" or "OFF", and is prepared for RAM of the computer 24 for RIP. Next, based on the flow chart shown in drawing 3, the amount information processing of ink performed in RIP20 is explained. This amount information processing of ink is also the printing setting processing mentioned above and the processing similarly performed by CPU with which the computer 24 for RIP of RIP20 is equipped.

[0050] In the first step S200, transmission of the ink residue in a printer 30 is first required from a printer 30. If an ink residue is transmitted from a printer 30 according to this Request to Send, the ink residue transmitted in S210 will be received. And in S220, an ink residue is displayed on the display 21 with which RIP20 is equipped. With this operation gestalt, graphical representation of the ink residue is carried out like the example of a screen display shown in drawing 6. In drawing 6, the ink residue is displayed on the field A of the central part of a screen, and it displays with the bar graph with which the graduation of 0,100 was shaken. Here, the field which gave the slash shows the residue of the ink of each color.

[0051] In S230, it judges whether a printing setup is memorized. As mentioned above, a printing setup by the user is made in advance of printing (S110 in drawing 2), and it memorizes to the printing setting field to which these contents of a setting were prepared for RAM of the computer 24 for RIP (S130 in drawing 2). Therefore, with reference to the printing setting field prepared for RAM of the computer 24 for RIP here, it judges whether a printing setup by the user is memorized. When a printing setup is memorized here (S230:YES), it shifts to S240. On the other hand, when the printing setup is not memorized (S230:NO), it shifts to S290.

[0052] In S240, the amount of need [that RAM of the computer 24 for RIP memorized] ink is read. And the amount of need ink read into the display 21 with which RIP20 is equipped in S250 is displayed. In this operation gestalt, as shown in the example of a screen display of drawing 6, the amount of need ink is displayed by the mark of the triangle which shows the location on a graph to the bar graph which shows the amount of ink displayed on Field A. That is, in drawing 6, since the slash field in a bar graph shows the ink residue, when the location shown by the mark of this triangle has crossed the slash field (i.e., when it is in the side near the graduation of "100"), ink will run short. Therefore, the display screen shown in drawing 6 shows running short about the ink of black, although it does not run short about the ink of cyanogen, a Magenta, and yellow.

[0053] In S260, it judges whether ink runs short. It judges whether this processing measures the ink residue received in S210, and the amount of need ink read from RAM of the computer 24 for RIP in S240 for every color, and runs short of ink. When it is judged that ink runs short here (S260:YES), the purport which runs short of ink in S270 is displayed on the display 21 of RIP20, and it shifts to S300 after that. On the other hand, when it is judged that ink does not run short (S260:NO), a printing beginning flag is turned ON in S280, and it shifts to S300 after that.

[0054] The display of the purport which runs short of the ink performed in S270 is displayed on the field B different from graphical representation, as shown in drawing 6. In drawing 6, since the ink of black is insufficient, the message "the ink of black runs short" is outputted.

[0055] Moreover, the display of the amount of need ink is cleared in S290 which shifts when negative judgment is carried out by S230. This processing is performed when negative judgment is carried out by S230 (i.e., when the printing setup is not memorized to the printing setting field prepared for RAM of the computer 24 for RIP), but the information memorized to the printing setting field is deleted after transmission of the data for printing to a printer 30 so that it may mention later. That is, when printing is started by the printer 30, since the display of the amount of need ink becomes unnecessary, it clears the display of the amount of need ink. Then, it shifts to S300.

[0056] In S300, it judges whether predetermined time which it says, for example is 3 seconds passed. When it is judged that predetermined time passed here (S300:YES), the processing from S200 is repeated. On the other hand, before predetermined time passes, (S300:NO) and this decision processing are repeated. If the Request to Send of an ink residue will be performed at intervals of predetermined time to a printer 30 (S200) and, as for RIP20, a user fills up ink a screen display will also be updated by this processing of S300 according to it.

[0057] Next, based on the flow chart of drawing 4, the printing control processing in RIP20 is explained. This printing control processing is also performed by CPU of the computer 24 for RIP with which RIP20 is equipped, and is performed following the printing setting processing which mentioned above using drawing 2.

[0058] In the first step S400, it judges first whether a printing beginning flag is ON. When a printing beginning flag is ON here (S400:YES), it shifts to S410. On the other hand, before a printing beginning flag serves as ON, when (S400:NO, i.e., a printing beginning flag) is OFF, this decision processing is repeated.

[0059] In S410, the image data as data a printing setup memorized by RAM of the computer 24 for RIP and for printing is read. And the image data read in S420 based on the printing setup is changed into the data for printing in which

printing processing is possible by the printer 30.

[0060] And in S430, the data for printing are transmitted to a printer 30. By this transmitting processing of S430, by the printer 30, printing to recorded media is performed so that it may mention later. In S440, a printing setup which cleared the printing setting field, namely, was memorized is deleted, and this printing control processing is ended after that. By clearing a printing setting field, negative judgment will be carried out by S230 in the amount information processing of ink shown in drawing 3.

[0061] Although the processing explained above is the processing performed in RIP20 next, the printing side processing performed in a printer 30 corresponding to the processing mentioned above is explained based on the flow chart of drawing 5. In the first step S500, it judges first whether data were received from RIP20. When it is judged that data were received from RIP here (S500:YES), it shifts to S510. On the other hand, before receiving data from RIP20, (S500:NO) and this decision processing are repeated. That is, processing after S510 will not be performed without receiving a certain data from RIP20.

[0062] The data received from RIP20 are analyzed in S510. And in S520 continuing, branching processing based on the analysis result of data is performed. When the data from RIP20 are the Request to Send of an ink residue, it shifts to S530. This is the case where the data transmitted by the processing of S200 shown in drawing 3 are judged. At this time, the ink residue which detected the ink residue in S530 and was detected in S540 is transmitted to RIP20. In RIP20, the processing of S210 in drawing 3 will receive the transmitted ink residue. Then, this printing side processing is ended.

[0063] When the data from RIP20 are data for printing, it shifts to S550. This is the case where the data transmitted by the processing of S430 shown in drawing 4 are judged. At this time, printing to recorded media is performed in S550 based on the received amount data of printings. Then, this printing side processing is ended.

[0064] When the data from RIP20 are not the Request to Send or the amount data of printings of an ink residue, either, in S560, corresponding to the received data, processing is performed and this printing side processing is ended after that. Next, the effectiveness which the print system of this operation gestalt demonstrates is explained. In addition, in order to make an understanding of explanation here easy, the conventional trouble is explained first.

[0065] As the ink of a printer 30 was printing, when it ran short in the print system conventionally, quality of printing could not be maintained but there was a case where redo of printing was needed. Especially, in oban printing, for example, printing of A0 size or the magnitude beyond it, if redo of such printing arises, the cost of recorded media or ink will increase.

[0066] On the other hand, in the print system of this operation gestalt, if there are printing activation directions from a user (S110 in drawing 2), a printing beginning flag will be turned off (S140 in drawing 2), and printing will be made not to perform (S400:NO in drawing 4). RIP20 requires transmission of the ink residue in a printer 30 (S200 in drawing 3), and receives the ink residue transmitted from a printer 30 according to this demand (S210 in drawing 3). Moreover, in RIP20, the amount of need [of being the amount of ink which is needed by the printer 30 in printing] ink is predicted based on a printing setup from the data and the user for [which is transmitted from a terminal 10] printing (S120 in drawing 2). And the ink residue received from the printer 30 and the predicted amount of need ink are indicated by comparison using a graph for every ink of each color (refer to S220 and S250 in drawing 3 R> 3, and drawing 6). That is, in advance of activation of printing, it displays in the condition that an ink residue and the amount of need ink can be measured. Moreover, an ink residue and the amount of need ink are measured (S260 in drawing 3), and when ink runs short, (S260:YES in drawing 3) and that are displayed (S270 in drawing 3). By this, a user can fill up ink, before printing processing is started, as a result, is in the middle of printing, and can prevent that ink is lost.

[0067] Moreover, by the print system of this operation gestalt, RIP20 performs the Request to Send of an ink residue with a predetermined time interval (S300:YES in drawing 3, S200). Therefore, if ink is filled up by the user after the display of the purport which runs short of ink is made, the ink residue after a supplement will be received (S210 in drawing 3). Therefore, after an updating indication of the ink residue is given (S220 in drawing 3) and ink is filled up, it is judged anew whether ink runs short in the middle of printing processing (S260 in drawing 3). Consequently, it can check whether the filled-up ink is truly sufficient, and is very convenient for a user. Moreover, since a printer 30 is a color printer as mentioned above, for example, even if it is the case where the ink of another color has been filled up by mistake when the ink of a certain color is insufficient, possibility of noticing the mistake becomes high.

[0068] Although RIP20 predicts the amount of need ink in the print system of this operation gestalt further again based on a printing setup from the data and the user for [which is transmitted from a terminal 10] printing, at this time, preview data are generated from the data for printing (S100 in drawing 2), and the amount of need ink is predicted based on this preview data (S120 in drawing 2). That is, since it is small compared with the number of pixels of the image based on the data for printing, the number of pixels of the image based on the preview data used as the candidate

for count can shorten the computation time which prediction of the amount of ink takes.

[0069] In addition, CPU of the computer 24 for RIP with which RIP20 of this operation gestalt is equipped

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, in such a print system, the ink of an airline printer is in the middle of printing, and may be insufficient. At this time, there were some airline printers which continue printing while ink had been lost. In this case, since a color omission occurs, it will be necessary to perform printing processing again.

[0005] Moreover, it reported that ink was lost and the airline printer which interrupts printing processing in the phase also occurred. After replacing ink with such an airline printer, printing processing is continuable from an interruption part. However, even if it is this case, by stopping, as recorded media, such as a form, are once printings, setting and a gap arise in recorded media, printing unevenness will be made or printing will become discontinuity before and behind an interruption part.

[0006] That is, when the ink of an airline printer is in the middle of printing and runs short, it is necessary to perform printing processing again in many cases. Especially, in oban printing, for example, printing of A0 size or the magnitude beyond it, if redo of such printing arises, since the cost of recorded media or ink is large, remarkable damage will occur.

[0007] This invention is made in order to solve the trouble mentioned above, and it aims at a user enabling it to grasp whether ink runs short in the middle of printing in an airline printer in advance of printing.

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MEANS

"The amount prediction means of need ink",

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view showing the outline configuration of the print system of an operation gestalt.

[Drawing 2] It is the flow chart which shows the printing setting processing in RIP.

[Drawing 3] It is the flow chart which shows the amount information processing of ink in RIP.

[Drawing 4] It is the flow chart which shows the printing control processing in RIP.

[Drawing 5] It is the flow chart which shows the printing side processing in a printer.

[Drawing 6] It is the explanatory view which illustrates the screen display of the amount information of ink.

[Description of Notations]

10 -- Terminal

11 -- Display 12 -- Mouse

13 -- Keyboard 14 -- Computer for terminals

20 -- RIP (raster image processor)

21 -- Display 22 -- Mouse

23 -- Keyboard 24 -- Computer for RIP

30 -- Printer 40 -- Network

[Translation done.]

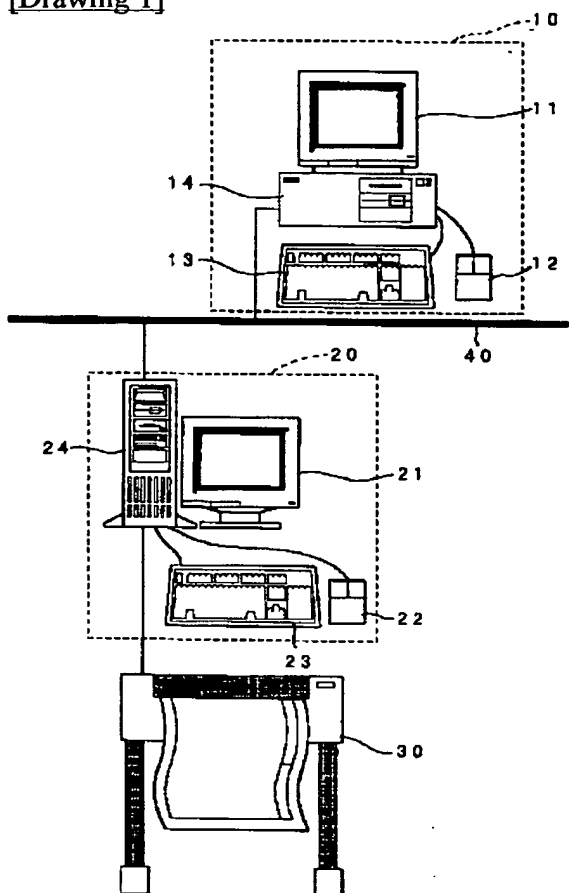
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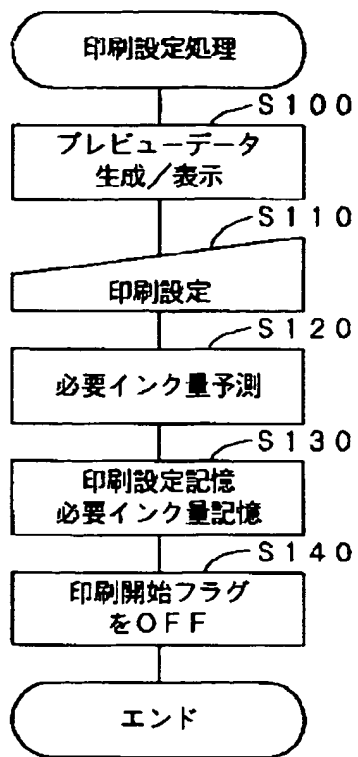
1. This document has been translated by computer. So the translation may not reflect the original precisely.
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DRAWINGS

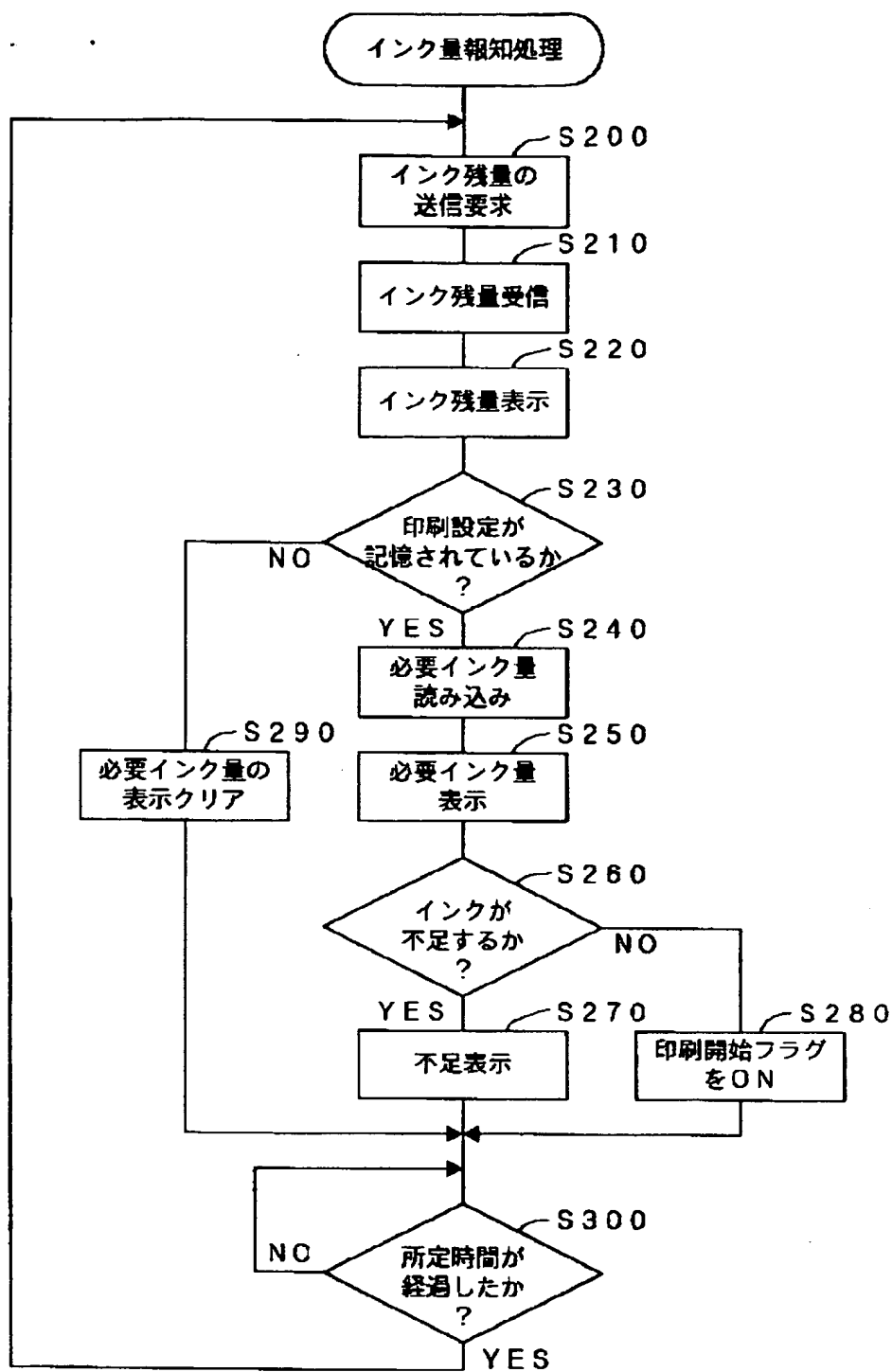
[Drawing 1]



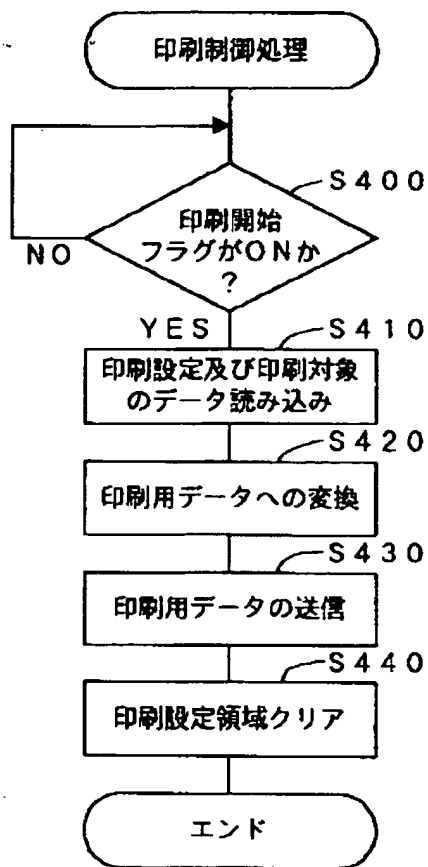
[Drawing 2]



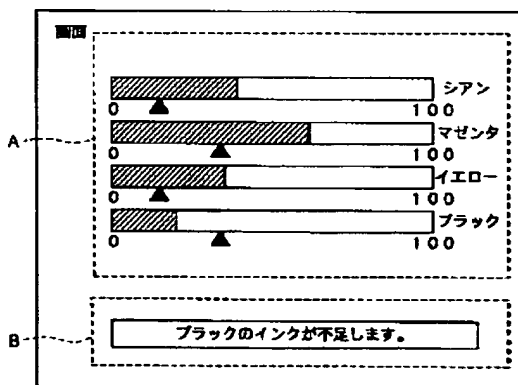
[Drawing 3]



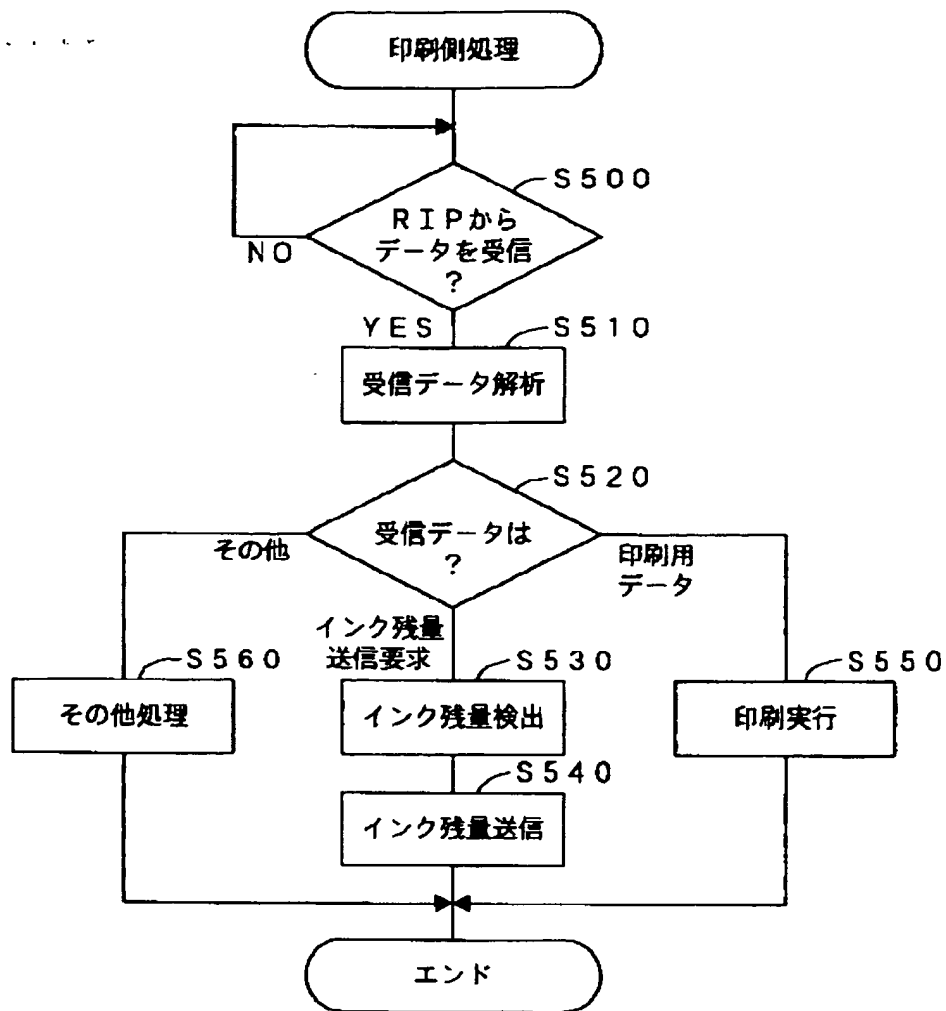
[Drawing 4]



[Drawing 6]
画面表示例



[Drawing 5]



[Translation done.]